

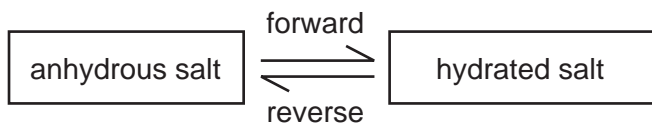
1 Which reaction is reversible?

- A  $\text{Cu} + \text{ZnSO}_4 \rightarrow \text{CuSO}_4 + \text{Zn}$
- B  $\text{CuO} + \text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + \text{H}_2\text{O}$
- C  $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$
- D  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O} \rightarrow \text{CuSO}_4 + 5\text{H}_2\text{O}$

2 Which reaction is **not** a reversible reaction?

- A combustion of alkanes
- B hydration of anhydrous copper(II) sulfate
- C melting lead(II) bromide
- D thermal decomposition of hydrated cobalt(II) chloride

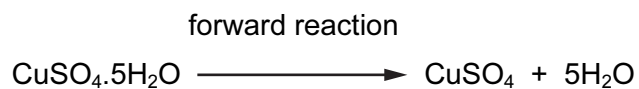
3 The diagram shows the change from an anhydrous salt to its hydrated form.



Which statement is correct?

- A forward reaction requires heat and water
- B forward reaction requires water only
- C reverse reaction requires heat and water
- D reverse reaction requires water only

- 4 The equation shows a reaction that is reversed by changing the conditions.



How can the forward reaction be reversed?

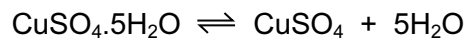
	by adding water	by heating
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

- 5 When green iron(II) sulfate is heated, it turns white and a colourless liquid is produced. When the liquid is put back into the white solid it changes back to green.

What type of reaction takes place and what is the name of the liquid?

	type of reaction	name of liquid
<b>A</b>	redox	sulfuric acid
<b>B</b>	redox	water
<b>C</b>	reversible	sulfuric acid
<b>D</b>	reversible	water

- 6 The equation shows the formation of anhydrous copper(II) sulfate from hydrated copper(II) sulfate.



Statements 1, 2 and 3 refer to this reaction.

- 1 Hydrated copper(II) sulfate is reduced to anhydrous copper(II) sulfate.
- 2 The (II) in the name copper(II) sulfate refers to the oxidation state of the metal.
- 3 The reaction is reversible.

Which statements are correct?

- A** 1 only      **B** 1 and 2      **C** 2 and 3      **D** 3 only

- 7 Heating pink cobalt(II) chloride crystals forms a blue solid and steam.

The blue solid turns pink when water is added.

Which terms describe the pink cobalt(II) chloride and the reaction?

	pink cobalt(II) chloride is	the reaction is reversible
<b>A</b>	anhydrous	yes
<b>B</b>	anhydrous	no
<b>C</b>	hydrated	yes
<b>D</b>	hydrated	no

8 The sign  $\rightleftharpoons$  is used in some equations to show that a reaction is reversible.

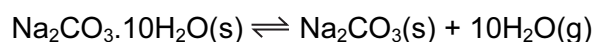
Two incomplete equations are given.

	reactants	products
<b>P</b>	$\text{CoCl}_2 + 2\text{H}_2\text{O}$	$\text{CoCl}_2 \cdot 2\text{H}_2\text{O}$
<b>Q</b>	$\text{C} + \text{O}_2$	$\text{CO}_2$

For which of these reactions can a  $\rightleftharpoons$  sign be correctly used to complete the equation?

	<b>P</b>	<b>Q</b>
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

9 The equation for the effect of heat on hydrated sodium carbonate is as shown.



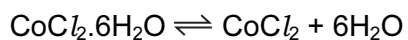
Statements made by four students about the reaction are given.

- P** Anhydrous sodium carbonate is formed.
- Q** Steam is formed.
- R** There is a colour change from blue to white.
- S** The reaction is reversible.

Which students' statements are correct?

- A** P, Q and R only
- B** P, Q and S only
- C** Q, R and S only
- D** P, Q, R and S

- 10 When pink crystals of cobalt(II) chloride are heated, steam is given off and the colour of the solid changes to blue.



What happens when water is added to the blue solid?

	colour	tempe
<b>A</b>	changes to pink	decreases
<b>B</b>	changes to pink	increases
<b>C</b>	remains blue	decreases
<b>D</b>	remains blue	increases

- 11 Which reaction will result in a decrease in pH?

- A** adding calcium hydroxide to acid soil
- B** adding citric acid to sodium hydrogen carbonate solution
- C** adding sodium chloride to silver nitrate solution
- D** adding sodium hydroxide to hydrochloric acid

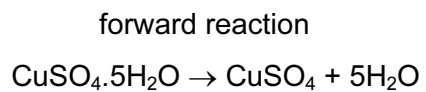
- 12 When blue copper(II) sulfate is heated, a white solid and water are formed.

The white solid turns blue and gives out heat when water is added to it.

Which terms describe the blue copper(II) sulfate and the reactions?

	the blue copper(II) sulfate is	reaction
<b>A</b>	a mixture	can be reversed
<b>B</b>	a mixture	cannot be reversed
<b>C</b>	hydrated	can be reversed
<b>D</b>	hydrated	cannot be reversed

13 The equation shows a reaction that is reversed by changing the conditions.



How can the forward reaction be reversed?

	by adding water	by heating
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x